REMARKS

It is believed that the above amendments and following remarks attend to each and every rejection and objection presented in the pending August 4, 2004 office action. Claims 1-33 remain pending, with claims 1, 18 and 25 being independent.

Specification

The final paragraph of page 13, starting "An advantage of a preferred..." is amended to insert a missing line, caused by a printing error, between pages 13 and 14. Support for the amendment is found on page 3, lines 18-19 of U.S. Provisional Application No. 60/272,747, filed March 1, 2001, from which this application claims benefit and incorporates by reference. In particular, U.S. Provisional Application No. 60/272,747 states "when ice grows on the power line or other surface being protected, the electric field between the conductor and the ice increases, reaching a plasma ignition threshold."

Claim Rejections

Claims 1-10, 12, 14 and 18-32 stand rejected under 35 U.S.C. § 102(b) as being anticipated by the background of the specification or the Gemini article pp 1-3, December 1996 (hereinafter "Gemini article"). Respectfully, we disagree.

The Examiner asserts that it is common knowledge that ice can form, and corona and plasma discharge can occur, on a power line. This is not, however, beneficial to melting ice on a power line as disclosed in the immediate application: plasma discharge increases power line losses and is typically avoided by power line designers.

More particularly, corona and plasma discharge within a gas proximate to a power line occurs when the electric field strength proximate to a conductor increases above a threshold, and disappears when the electric field strength reduces below that threshold. Further, the electric field strength proximate to the conductor is inversely proportional to the radius of the conductor. That is to say, a conductor with a large diameter has reduced electric field strength compared to a conductor with a small diameter, assuming both conductors carry the same voltage, frequency and current.

This field strength characteristic and corona and plasma discharge threshold is specifically of note when ice forms upon a conductor. As the ice forms, the radius of the conductor effectively increases since ice is a semiconductor and is in direct contact with the conductor. Thus, the more ice that forms on the conductor, the lower the strength of the electric field proximate to the conductor and therefore the lower the probability that a corona and plasma discharge will form around the conductor to melt the ice. Since a power line is typically designed such that losses are reduced during operation, corona and plasma discharge are specifically avoided (i.e., the electric field strength proximate to the conductor is lower then the corona and plasma discharge threshold) and it is therefore unlikely that corona and plasma discharge will occur when ice forms upon the conductor due to reduction in the electric field strength resulting from the increased radius of the conductor. Thus a prior art power line does not solve the problem of icing, or suggest the solution as provided by the immediate application.

The Examiner also asserts that "a small layer of air between the ice and the current carrying conductors" is formed. Respectfully, we disagree. Ice forms as moisture condenses and then freezes directly onto a conductor when ambient conditions (i.e., temperature below the freezing point of water and humidity above the dew point) prevail. The ice thus forms directly upon, and in contact with, the conductor and does not form an air gap as suggested by the Examiner.

In the immediate application, "'gas-filled layer' and related terms refer to a layer containing one or a plurality of **enclosed volumes** *[emphasis added]* of a plasma-forming gas," see page 7, lines 13-15. Thus the gas-filled layer has a specific structure to enclose the plasma-forming gas. The immediate application also teaches that "the composition and pressure of the gas in the gas-filled layer is selected so that the AEF causes electric breakdown and generates a plasma in the gas-filled layer," see page 5, lines 23-25. Nowhere does the immediate background or the Gemini article disclose or suggest such a gas-filled layer or the selecting of gas composition and pressure such that the AEF causes plasma in the gas-filled layer. Since the immediate background and the Gemini article do not disclose or suggest a structure around the gas-filled layer, clearly they do not teach or

suggest that the gas and/or the pressure of the gas within the gas-filled layer can be selected.

To anticipate a claim, the immediate background and the Gemini article must teach every element of the claim and "the identical invention must be shown in as complete detail as contained in the ... claim." *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989). The immediate background and the Gemini article do not teach every element of claims 1-10, 12, 14 and 18-32.

Claim 1 recites a system for melting ice that includes an electrical conductor for generating an AEF in response to an AC voltage, a gas-filled layer proximate to the electrical conductor, the gas-filled layer containing a plasma-forming gas for forming a plasma in response to an AEF. The system of claim 1 specifically requires a structure for 'containing a plasma-forming gas' as, for example, described by FIG.3 and page 9, lines 9-21, of the immediate application. This structure is not disclosed or suggested - anywhere - by the immediate background or by the Gemini article.

Reconsideration of claim 1 is requested.

Claims 2-10, 12 and 14 depend from claim 1 and benefit from like arguments; but in addition these claims have other features that patentably distinguish over the immediate background and the Gemini article. For example, claim 2 recites a conductive layer located proximate to the electrical conductor. Nowhere does the immediate background or the Gemini article disclose or suggest a conductive layer proximate to the conductor. Claim 3 recites that the gas-filled layer is located between the electrical conductor and the conductive layer. Nowhere does the immediate background or the Gemini article disclose or suggest a gas-filled layer located between the electrical conductor and the conductive layer. Claim 4 recites that the conductive layer is ice. As shown in FIG. 3 and described on page 9 of the immediate application, the conductive layer is insulated from the conductor by the gas-filled layer. Nowhere does the immediate background or the Gemini article teach or suggest ice as a conductor that is insulated

from the conductor. Claim 10 recites that the gas-filled layer comprises a gas selected from the group consisting of air, nitrogen and argon. Nowhere does the immediate background or the Gemini article teach or suggest the use of nitrogen and/or argon as the plasma-forming gas. Claim 12 recites an outer shell, wherein the gas-filled layer is disposed between the electrical conductor and the outer shell. Nowhere does the immediate background or the Gemini article teach or suggest the gas-filled layer disposed between the electrical conductor and the outer shell. Claim 14 recites that the outer shell is electrically conductive. Nowhere does the immediate background or the Gemini article teach or suggest that the outer shell is electrically conductive.

Reconsideration of claims 2-10, 12 and 14 is requested.

Claim 18 recites a system for generating heat, including an electrical conductor for generating an AEF in response to an AC voltage, a gas-filled layer proximate to the electrical conductor, the gas-filled layer containing a plasma-forming gas for forming a plasma in response to an AEF, and an AC power source for applying an AC voltage to the electrical conductor. Again, the system of claim 18 specifically requires a structure for 'containing a plasma-forming gas' as, for example, described by FIG.3 and page 9, lines 9-21, of the immediate application. This structure is not disclosed or suggested by the immediate background or by the Gemini article. Thus, claim 18 cannot be anticipated by the immediate background or the Gemini article. Reconsideration of claim 18 is requested.

Claims 19-24 depend from claim 18 and benefit from like arguments; but these claims have additional features that patentable distinguish from the immediate background and the Gemini article. For example, claim 19 recites a conductive layer located proximate to the electrical conductor and claim 20 recites that the gas-filled layer is located between the electrical conductor and the conductive layer. Nowhere does the immediate application or the Gemini article teach or suggest a gas filled layer located between the electrical conductor and the conductive layer. Claim 21 recites that the AC power source provides an AC voltage for generating an AEF having sufficient field strength to cause electric breakdown of gas in the gas-filled layer when a conductive

layer is proximate to the electrical conductor. Since the immediate background or the Gemini article do not teach or suggest a gas-filled layer, they cannot anticipate claim 21.

Reconsideration of claims 19-24 are respectfully requested.

Claim 25 recites a method for melting ice, including a step of generating an AEF in a gas-filled layer proximate to the ice for causing electric breakdown of gas and the formation of plasma in the gas-filled layer. As specified by the definition of the "gas-filled layer" on page 7, lines 13-15, of the immediate application, this layer is enclosed. As argued above, nowhere does the immediate background or the Gemini article teach of an enclosed gas-filled layer proximate to the conductor.

Reconsideration of claim 25 is respectfully requested.

Claims 26-32 depend from claim 25 and benefit from like arguments; but in addition these claims also have other features that patentably distinguish over the immediate background and the Gemini article. For example, claim 31 recites disposing the gas-filled layer between the electrical conductor and a conductive layer; and claim 32 recites that the conductive layer includes ice. Nowhere does the immediate background or the Gemini article teach or suggest a gas-filled layer between the electrical conductor and a conductive layer, or that the conductive layer is ice.

Reconsideration of claims 26-32 is respectfully requested.

Claim Rejections – 35 U.S.C. § 103

Claims 11, 13, 15 and 33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the immediate background or the Gemini article. Respectfully, we disagree.

To establish a *prima facie* case of obviousness, three basic criteria must be met.

> **First**, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings.
>
> **Second**, there must be a reasonable expectation of success.

> **Finally**, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. MPEP § 2143, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)

As argued above in connection with independent claims, the immediate background and the Gemini article thus do not and cannot disclose each and every element of claims 11, 13, 15 and 33; the immediate background and Gemini article therefore also fail to render these claims obvious under 35 U.S.C. §103. But these claims provide additional reasons for patentability.

For example, claim 15 teaches of a switch for electrically shorting the electrical conductor and the conductive outer shell. The "system is turned "off" by closing the switch, which electrically shorts the electrical conductor and the outer shell, thereby reducing the electric field strength in the gas-filled layer to substantially zero and practically preventing electric breakdown and discharge." See page 12 lines 17-20 of the immediate application. Contrary to the Examiner's suggestion, switching the power from off to on does not have the same function as the switch of claim 15. Claim 15 requires that a switch connects the conductive outer shell to the conductor. Clearly, this switch does not connect or disconnect power to or from the conductor as suggested by the Examiner.

Claim 13 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the immediate background of the invention or the Gemini article in view of UK Patent No.1096087 (hereinafter "UK'087"). We respectfully disagree.

UK'087 discloses "a smooth joint between a conductor and each insulator which surrounds and supports the conductor, thereby to improve the breakdown characteristics of the conductor." See UK'087 page 1, column 1, lines 37-42. UK'087 further discloses that "to overcome the problem of corona, a continuous coating of plastic material 16 is applied to the insulator 13 and the conductor 12 to provide an unbroken surface on the

insulator and the conductor as shown in FIG. 3." See UK'087 page 2, column 1, lines 7-12. Claim 13 recites that the outer shell is electrically nonconductive and requires that the gas-filled layer is disposed between the electrical conductor and the outer shell (see claims 1 and 12). UK'087 only discloses a solution to "overcome the problem of corona" and does not disclose or suggest a solution to icing of power lines. It would, therefore, not have been obvious to use UK'087 in view of the immediate background and the Gemini article to provide a solution for deicing power lines. Further, the insulator disclosed by UK'087 is continuous and applied directly to the conductor and does not include a gas-filled layer.

Reconsideration of claims 11, 13, 15 and 33 is requested.

We thank the Examiner for his indication of allowable subject matter. Reconsideration and allowance of all claims is respectfully requested. Should any questions arise, the Examiner is encouraged to telephone the undersigned attorney.

It is believed that no fees are due in connection with this amendment. If any fee is due in connection with this matter, please charge Deposit Account No. 12-0600.

Respectfully submitted,

Date: Nov 4, 2004

By [signature]

Curtis Vock, Reg. No. 38,356
LATHROP & GAGE L.C.
4845 Pearl East Circle, Suite 300
Boulder, CO 80301
Tel: (720) 931-3011
Fax: (720) 931-3001